

Appl. No. 10/085,061

Amdt. dated June 13, 2007

Reply to Office action of December 14, 2006

Atty. Docket No. AP1107US

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. Cancelled without prejudice.

2. (Currently amended) A method as claimed in claim 17, wherein ~~[[each]]~~ a frequency domain input DMT signal is passed through an IFFT unit which produces a time domain DMT signal $x(n)$ and derives said absolute maximal value $|M|$ and said location.

3. Cancelled.

4. (Cancelled)

5. (Previously presented) A method as claimed in claim 17, wherein said signature waveform has fewer samples than said DMT signal, and said signature waveform is first aligned with said signal peak prior to subtraction.

6. (Previously presented) A method as claimed in claim 5, wherein said signature waveform is first multiplied by a scaling factor (C) to match said DMT signal.

7. (Currently amended) A method as claimed in claim 6, wherein said scaling factor (C) is determined from said absolute maximal value $|M|$.

8. (Currently amended) A method of effecting peak reduction in a DMT signal, comprising the steps of:

- (i) providing a predetermined signature waveform;
- (ii) for each frame of samples of the DMT signal ($x(n)$), identifying ~~[[a]]~~ an absolute

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maximal value $|M|$ of amplitude of said samples $[(M)]$ and the location (I) of said absolute maximal value within said frame, said absolute maximal value corresponding to a signal peak,

(iii) comparing the absolute maximal value with a predetermined threshold value and, if the absolute maximal value is not less than the predetermined threshold value (T),

(iv) multiplying the predetermined signature waveform by a scaling factor (C) to obtain a scaled signature waveform, and

(v) subtracting said scaled signature waveform from said DMT signal frame in the region of said signal peak so as to reduce said peak to a level substantially equal to said predetermined threshold value,

wherein said signature waveform has fewer samples than said DMT signal, and said signature waveform is $[(first)]$ aligned with said signal peak prior to subtraction, said signature waveform $[(is)]$ first being multiplied by a scaling factor (C) to match said DMT signal, and said scaling factor (C) $[(is)]$ being determined from said absolute maximal value $|M|$ in accordance with the equation $C = (|M| - 0xXXXXXX) \times sgn(M)$ where $0xXXXXXX$ is said predetermined maximum level:

$$C = \begin{cases} (|M| - T) \times sgn(M) & |M| > T \\ 0 & |M| \leq T \end{cases}$$

9. (Currently amended) A method as claimed in claim 8, wherein the result of multiplying the scaling factor with said signature waveform is first shifted to match the number of bits per sample in the result with the number of bits representing the time-domain DMT signal $x(n_i)$.

10. (Cancelled).

11. (Currently amended) A method of effecting peak reduction in a DMT signal, comprising the steps of:

creating a predetermined signature waveform, and

subtracting said predetermined signature waveform from said DMT signal $x(n_i)$ in the region of a signal peak whenever the DMT signal is above a predetermined threshold value (T) maximum

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level,

wherein said signature waveform is generated by passing a predetermined waveform through a waveform modifying circuit on an iterative basis until the waveform change is insignificant between samples successive iterations or a maximum number of iterations is reached; and

wherein said waveform modifying circuit comprises

an IFFT unit to produce said signature waveform $s(n)$ in the time domain,

a waveform restriction unit to produce a modified time domain signature waveform signal $s_1(n)$,

an FFT unit to produce a frequency domain modified waveform signal $[[S(k)]]$ $(S(k))$ and

a spectrum restriction unit to produce a band limited frequency signal $[[S_1(k)]]$ $(S_1(k))$ which is passed back to said IFFT unit as part of said iterative process.

12. Cancelled.

13. (Currently amended) An arrangement as claimed in claim 21, wherein said identifying means comprises an IFFT unit for ~~generating a~~ transforming an input frequency domain DMT signal to obtain a time domain DMT signal from said DMT signal which is applied to a subtractor and means for identifying said maximum absolute maximal value $|M|$ and said location.

14. Cancelled.

15. (Currently amended) An arrangement for effecting peak reduction in a DMT signal according to claim 21, wherein;

the subtracting means subtracts said predetermined signature waveform from said DMT signal in the region of a signal peak whenever the DMT signal is above a predetermined threshold value maximum level, and

wherein an IFFT unit is provided for generating a time domain signal from said DMT signal

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which is applied to a subtractor,

said IFFT unit having two additional outputs representing respectively the absolute maximal value $|M|$ and location of said ~~maximum~~ absolute maximal value in said DMT signal, and

wherein said additional outputs are applied to respective inputs of a threshold calculation unit that generates said scaling factor for said signature waveform when said absolute maximal value is above $[[a]]$ said predetermined threshold value.

16. (Currently amended) An arrangement for effecting peak reduction in a DMT signal, comprising:

a first unit for creating a predetermined signature waveform, and

a second unit for subtracting said predetermined signature waveform from said DMT signal in the region of a signal peak whenever the DMT signal is above a predetermined threshold value ~~maximum level~~,

wherein said second unit comprises an IFFT unit for transforming an input frequency domain DMT signal to obtain generating a time domain signal from said DMT signal which is applied to a subtractor,

said IFFT unit has two additional outputs representing respectively the maximal value and location of said maximum value $|M|$ in said DMT signal,

and wherein said additional outputs are applied to respective inputs of a threshold calculation unit that generates a scaling factor for said signature waveform when said absolute maximal value is above $[[a]]$ said predetermined threshold value, and

wherein said first unit comprises

an IFFT unit for generating a time domain signal from a predetermined input waveform,

a time domain waveform restriction unit,

an FFT unit for producing a modified frequency domain waveform, and

a spectrum limiting unit for said modified frequency domain waveform, an output of

said spectrum limiting unit being applied to an input of said IFFT unit to permit generation of said signature waveform by means of an iterative process.

17. (Currently amended) A method of effecting peak reduction in a DMT signal, comprising the steps of:

- (i) providing a predetermined signature waveform;
- (ii) for each frame of samples of the DMT signal ($x(n_i)$), identifying $[[a]]$ an absolute maximal value $|M|$ of amplitude of said samples $[[f(M)]]$ and the location (I) of said absolute maximal value $|M|$ within said frame, said absolute maximal value corresponding to a signal peak,
- (iii) comparing the absolute maximal value with a predetermined threshold value (T) and, if the absolute maximal value is not less than the threshold value (T),
- (iv) multiplying the predetermined signature waveform by a scaling factor (C) to obtain a scaled signature waveform, and
- (v) subtracting said scaled signature waveform from said DMT signal frame in the region of said signal peak so as to reduce said peak to a level substantially equal to said predetermined threshold value,

wherein said signature waveform is generated by passing a predetermined waveform through a waveform modifying circuit on an iterative basis until the waveform change is insignificant between samples successive iterations or a maximum number of iterations is reached.

18. (Currently amended) A method according to claim 17, wherein the scaling factor (C) is derived from the absolute maximal value $|M|$ and the threshold value (T).

19. (Currently amended) A method of effecting peak reduction in a DMT signal, comprising the steps of:

- (i) providing a predetermined signature waveform;
- (ii) for each frame of samples of the DMT signal ($x(n_i)$), identifying $[[a]]$ an absolute maximal value $|M|$ of amplitude of said samples $[[f(M)]]$ and the location (I) of said

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absolute maximal value $|M|$ within said frame, said absolute maximal value $|M|$ corresponding to a signal peak.

(iii) comparing the absolute maximal value with a predetermined threshold value (T) and, if the absolute maximal value is not less than the threshold value (T),

(iv) multiplying the predetermined signature waveform by a scaling factor (C) to obtain a scaled signature waveform, and

(v) subtracting said scaled signature waveform from said DMT signal frame in the region of said peak so as to reduce said peak to a level substantially equal to said predetermined threshold value (T),

wherein the scaling factor (C) is determined from the absolute maximal value $|M|$ and the threshold value (T) in accordance with the equation

$$C = \begin{cases} (|M| - T) \times \text{sgn}(M) & |M| > T \\ 0 & |M| \leq T \end{cases}$$

~~$C = (|M| - 0 \times \text{XXXXX}) \times \text{sgn}(M)$ where $0 \times \text{XXXXX}$ is said threshold value.~~

20. (Currently amended) A method of effecting peak reduction in a DMT signal, comprising the steps of:

(i) providing a predetermined signature waveform;

(ii) for each frame of samples of the DMT signal ($x(n)$), identifying $[[a]]$ an absolute maximal value $|M|$ of amplitude of said samples $[[a]]$ and the location (I) of said absolute maximal value $|M|$ within said frame, said absolute maximal value $|M|$ corresponding to a signal peak.

(iii) comparing the absolute maximal value with a threshold value (T) and, if the absolute maximal value is not less than the threshold value (T),

(iv) multiplying the predetermined signature waveform by a scaling factor (C) to obtain a scaled signature waveform, and

(v) subtracting said scaled signature waveform from said DMT signal frame in the region

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of said signal peak so as to reduce said peak to a level substantially equal to said predetermined threshold value,

wherein the scaled signature waveform is passed through a bit shifter to match the number of bits per sample thereof with the number of bits in the samples of the time domain DMT signal $(x(n))$.

21. (Currently amended) An arrangement for effecting peak reduction in a DMT signal, comprising:

- (i) means for providing a predetermined signature waveform;
- (ii) means for identifying, for each frame of samples of the DMT signal $(x(n))$, $[[a]]$ an absolute maximal value $|M|$ of amplitude of said samples $[[M]]$ and the location (I) of said absolute maximal value within said frame, said absolute maximal value $|M|$ corresponding to a signal peak,
- (iii) means for comparing the absolute maximal value $|M|$ with a threshold value (T) and; if the maximal value is not less than the threshold value,
- (iv) means operable, if the absolute maximal value is not less than the threshold value, for multiplying the predetermined signature waveform by a scaling factor (C) to obtain a scaled signature waveform, and
- (v) means for subtracting said scaled signature waveform from said DMT signal frame in the region of said signal peak so as to reduce said peak to a level substantially equal to said predetermined threshold value,

wherein said predetermined signature waveform generating means generates said signature waveform by passing a predetermined waveform through a waveform modifying circuit on an iterative basis until the waveform change is insignificant between samples successive iterations or a maximum number of iterations is reached.

22. (Currently amended) An arrangement for effecting peak reduction in a DMT signal, comprising:

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means for creating a predetermined signature waveform, and

means for subtracting said predetermined signature waveform from said DMT signal in the region of a signal peak whenever the DMT signal $(x(n))$ is above a predetermined threshold value (T) maximum level,

wherein said signature waveform creating means generates the signature waveform by passing a predetermined waveform through a waveform modifying circuit on an iterative basis until the waveform change is insignificant between samples successive iterations or a maximum number of iterations is reached, and

wherein said waveform modifying circuit comprises

an IFFT unit to produce said signature waveform $s(n)$ in the time domain,

a waveform restriction unit to produce a modified time domain signature waveform signal $s_1(n)$,

an FFT unit to produce a frequency domain modified waveform signal $S(k)$ and

a spectrum restriction unit to produce a band limited frequency signal $S_1(k)$ which is passed back to said IFFT unit as part of said iterative process.